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## APPARATUS FOR ATTACHMENT OF PIPES

The invention concerns an apparatus for attachment of pipes to a constructional element, such as a nipple or the like, which  
5 apparatus is more closely defined in the preamble of claim 1.

For attachment of pipes to nipples, clamping screw joints and sliding sleeve joints are previously known.

10 When assembling previously known clamping screw joints, firstly a screw sleeve and a clamping ring are slipped onto a pipe end, which then is pushed onto a cylindrical support sleeve of a nipple. Thereupon, the screw sleeve is screwed on and tightened  
15 by means of a suitable spanner. A characterizing feature of such a screw joint is, that manufacturing tolerances must be chosen such, that the pipe can be pushed onto said sleeve and the external diameter of the pipe thereby will not be changed in such a way, that subsequently the clamping ring and the screw sleeve  
20 no longer can be assembled.

Previously known sliding sleeve joints necessitate often widening of a pipe to enable same to be pushed onto a support sleeve, as the latter has a larger external diameter than in connection with screw joints, so that by means of a sliding sleeve the pipe wall  
25 can be compressed to that extent, that on the one side the pipe material will be pressed into recesses of the support sleeve and on the other side radial forces exerted by the support sleeve will be sufficient to guarantee a safe joint.

30 A drawback with the previously known clamping screw joints and sliding sleeve joints is, that each of them shows specially designed support sleeves and constructional elements provided with such sleeves, respectively. This is disadvantageous in so far, as the joining of pipes by means of sliding sleeves, which  
35 per se is easier to accomplish, not always is possible for space reasons, in which case a clamping screw joint composed of completely different parts has to be chosen. This necessitates the provision of different sets of nipples and accessories

suitable for a clamping screw joint and for a sliding sleeve joint, respectively. Other reasons for choosing either sliding sleeve joints or clamping screw joints is that the former often are used as permanent joints and the latter as detachable joints.

5 Further drawbacks with previously known joints of any kind are complex and therefore expensive designs, liability to leakage and/or break-down as well as assemblage problems of various kinds.

10 A typical sliding sleeve joint is previously known by EP-A-0 159 997. A typical clamping screw joint is previously known by US-A-3 174 778. Each of these joints is specially designed for its purpose. No provisions have been made for alternative or simultaneous use as a sliding sleeve joint and/or a clamping  
15 screw joint, respectively. Consequently, none of such joints is usable for any other purpose than what they are specially designed for.

An objective of the present invention is to provide an apparatus,  
20 which optionally may be used for a clamping screw joint and/or a sliding sleeve joint. Further objectives are to counteract and, as far as possible, eliminate the afore-mentioned drawbacks.

According to the invention, the above-mentioned and further  
25 objectives will be achieved by an apparatus of the afore-mentioned kind, which mainly is characterized by features as stated in the characterizing clause of claim 1. Further characteristics of the invention are revealed by the subclaims.

30 By means of the apparatus according to the invention, pipes may be attached to one and the same constructional element carrying a support sleeve optionally by a clamping screw joint, in which case a screw sleeve and a clamping ring will be used, or by way of a sliding sleeve joint, in which case a sliding sleeve and a  
35 press ring will be used. In very special cases calling for extraordinary safety measures, both types of joints may be used adjacent each other with the clamping screw joint closest to the constructional element.

The constructional element as such, e.g. a nipple, may be designed for internal or external screw joints, as straight or angled or multiple branch connection coupling or as T-conduit with uniform or reduced outlets, connectors or plates, parts of  
5 distributors etc.

The alternative or simultaneous applicability of either or both types of joints is made possible according to the invention i.a. by designing the support sleeve of the basic body of the constructional element with sections for a clamping screw joint and  
10 with at least partly other sections for a sliding sleeve joint.

According to a preferred embodiment of the invention, the constructional element carrying the supporting sleeve shows a  
15 conical ring surface adjacent to a bevel of the clamping ring, at an exterior surface of the constructional element carrying the supporting sleeve being provided a thread, onto which the screw sleeve may be screwed, the screw sleeve showing a conical surface associated to a further bevel at the exterior circumferential  
20 surface of the clamping ring.

Within the scope of the invention furthermore may be provided at the constructional element carrying the supporting sleeve a circular cylindrical abutment surface, to which is associated a  
25 circular cylindrical abutment surface of the clamping sleeve.

For practical reasons, the invention may furthermore provide that the section of the supporting sleeve associated to the clamping ring of the clamping screw joint is arranged adjacent to the constructional element carrying the supporting sleeve, while the  
30 section associated to the clamping sleeve of the clamping sleeve joint is provided within the region of the free end of the supporting sleeve, overlaps or common section profiling being possible.

35 When using the apparatus according to the invention for attachment of pipes to supporting sleeves, the pipes don't have to be widened any longer, such as this usually is necessary with

the conventional sliding sleeve joints. They may, of course, be widened, if this is expressly desired.

5 The invention furthermore offers the advantage of being applicable to the same extent for both plastic piping and metallic piping as well as for compound piping of plastic material and metal.

10 Further details and characteristics of the invention are revealed by the following description illustrating non-limiting embodiments of the invention with reference to the drawings.

Fig. 1 shows in a partially sectioned side elevational view a first, mirror-symmetrical embodiment of an apparatus  
15 according to the invention, the upper half showing a clamping screw joint and the lower half a sliding sleeve joint without any deformation of a press ring,

Fig. 2 shows a different, angled embodiment of a basic body of the apparatus according to the invention, the upper/left  
20 end of which forms part of an apparatus according to the invention, while some other kind of coupling is connectable to the lower/right end of said body,

Fig. 3 is a side elevational view of a clamping ring forming part of a clamping screw joint,

25 Fig. 4 is an end view of the ring as shown in fig. 3,

Fig. 5 is a side elevational view in diametrical section of an apparatus according to the invention, by means of which a pipe is attached to a basic body, uppermost by a sliding sleeve joint and lowermost by a clamping screw joint,

30 Fig. 6 is a magnified detail of a support sleeve of the basic body,

Fig. 7 is a side elevational view in diametrical section of a press ring forming part of a sliding sleeve joint and

Fig. 8 is a magnified detail of the press ring shown in fig. 7.

35

The essential parts of the apparatus for attachment of pipe ends to constructional elements, nipples or the like by way of a clamping screw joint and a sliding sleeve joint, respectively,

are as follows:

Common for both types of joints a basic body 1 with a coherent support sleeve 2, the external surface of which is profiled; a sliding sleeve 3 and a press ring 4 for a sliding sleeve joint; a slotted clamping ring 5 and a screw sleeve 7 for a clamping screw joint, the screw sleeve 7 being screwable with an internal thread 8 onto an external thread 9 of a circumferential shoulder 6 of the basic body 1, the external thread being provided adjacent to the support sleeve 2, preferably with an overlap in radial direction, where the base of the support sleeve within said shoulder 6 is surrounded by an axially open annular groove 19.

The principal parts of the apparatus according to the invention as defined hereinbefore are shown in fig. 5, which also shows the functional position of the said parts of a screw joint (lowermost) and a sliding sleeve joint (uppermost), upon a pipe 10 having been slipped onto the support sleeve 2 of the basic body 1. It will be appreciated, that the sliding sleeve joint and the clamping screw joint normally will not be used simultaneously but alternatively.

As revealed by fig.s 1, 2 and 5, the basic body 1 may be differently shaped, e.g. angled, T-shaped, cross-shaped and so forth with one, several or all ends designed as an apparatus according to the invention, while any remaining ends may be designed for couplings of any design.

The support sleeve 2, as it may be used within the framework of the invention at basic bodies 1, is shown on an enlarged scale in fig. 6. It is profiled at its external surface by annular grooves 12, 13 and by beads 14 provided therebetween, the arrangement being such, that in a section K at the free end 11 of the support sleeve 2 there are provided four grooves 12. Section K of the support sleeve 2 is the section, in which the press ring 4 is pressed by the sliding sleeve 3 from the outside against the pipe 10.

Fig. 6 shows furthermore, that on the external surface of the support sleeve 2 there are three grooves 13 provided in a section S, in which section the clamping ring 5 abuts the external surface of the pipe 10, when the latter is pressed against the support sleeve 2 by means of the screw sleeve 7 when establishing a clamping screw joint. As implied by fig. 1, sections K and S overlap each other, i.e. some groove(s) and/or beads are common to both sections.

- 10 The beads 14, each of which being arranged between two grooves 12 and 13, respectively, are preferably asymmetrical when seen in a cross-sectional view, the flanks 15 turned towards the free end 11 of the support sleeve 2 enclosing a more pointed angle with the axis 17 of the support sleeve 2 than the flanks 16 of the beads 14 facing the other side. The external surfaces 18 of the beads 14 are preferably cylindrical surfaces arranged coaxially in relation to the axis 17 of the support sleeve 2.

- 20 The sliding sleeve 3 is an annular body with bevels 20 at the ends of its internal surface 21, whereby the bevels 20 may include an angle of  $20^\circ$  with the axis of the sliding sleeve 3. Fig. 7 shows the press ring 4 used for the sliding sleeve joint, this press ring 4 being shown in fig. 8 on an enlarged scale.

- 25 The press ring 4 is a substantially sleeve-like body with an outwardly projecting flange 22 at its one end and a preferably substantially smooth internal surface 23. On the outside of the press ring 4, there are four beads 24 according to the embodiment as shown, the external surfaces 25 of which beads are coaxial, preferably cylindrical, surfaces in relation to the axis 26 of the press ring 4. The flanks 27 of the beads 24 enclose an angle of e.g.  $45^\circ$  with the axis 26, while the flank 28 of the end side bead 24 at the end 46 of the press ring 4 turned away from the flange 22 may enclose an angle of  $60^\circ$  with the axis 26 and connect to a shallow end groove 34 connecting in its turn to a thin free press ring end 37.

The flange 22 of the press ring 4 forms an abutment surface 29



which, in case of a sliding sleeve joint, is flush with an abutment surface 30 of the shoulder 6.

5 The clamping ring 5 of the clamping screw joint as shown in fig.s 3 and 4 is a ring with a slot 31, so that the clamping ring 5 may be contracted in radial direction. At the external surface of the clamping ring 5, there are bevels 32 (conical surfaces) which include an angle of e.g.  $30^\circ$  with the axis 33 of the clamping ring 5.

10

The screw sleeve 7 is principally shaped as a hexagonal nut and may be screwed with its internal thread 8 onto the external thread 9 of the basic body 1. When screwing the screw sleeve 7 onto the basic body 1, the sleeve will press with its bevel 35 against the clamping ring 5, whose one bevel 32 abuts the bevel 35 of the screw sleeve 7. The other bevel 32 of the clamping ring 5 abuts a bevel 36 of the basic body 1, which bevel is provided radially inside of the support surface 30 for the press ring 4, so that the clamping ring 5 is radially contracted when tightening the screw sleeve 7 and thereby deforms the pipe 10 such, that the pipe in the section S of the support sleeve 2 is pressed into the grooves 13 there.

25 In this connection, there may be used support sleeves 2 having a largest external diameter, which is larger than the internal diameter of the pipe 10 to be attached prior to its deformation, the pipe 10 being slidable onto the support sleeve 2 without preceding (plastical, i.e. permanent) widening (possibly with the aid of a tool). Such support sleeves should be considered falling under the definition: the external diameter of the support sleeve 30 2 being at the most equal to the internal diameter of the pipe 10 to be attached without any deformation. Support sleeves, on which the pipe 10 with the aid of a tool must be permanently plastically deformed by increasing its diameter, so that the pipe 35 may be pushed onto the support sleeve, are not considered to fall under the definition: the external diameter of the support sleeve is at the most equal to the internal diameter of the pipe to be attached prior to deformation.

The invention may be summarized as following:

For attachment of pipes 10 to nipples 1 showing a support sleeve 2, onto which the pipe 10 is slidable, there are provided for alternative application a screw sleeve 7 and a clamping ring 5 associated to the latter radially inside the same on the one side and a sliding sleeve 3 as well as a press ring 4 on the other side. When attaching the pipe 10 to the basic body 1 by means of a clamping screw joint, the clamping ring 5 will be pressed from the outside against the pipe 10 in section S of the support sleeve 2 by tightening the screw sleeve 7, whereby the latter is screwed onto the thread 9 of the nipple 1, so that the pipe becomes fixed to the support sleeve 2. Hereby, material of pipe 10 moves into the grooves in section S of the support sleeve 2.

When using the sliding sleeve 3 and the press ring 4 for attachment of the pipe 10 to the nipple 1, the pipe 10 is radially deformed in section K of the support sleeve 2 by the press ring 4 influenced by the sliding sleeve 3, so that material of the pipe 10 moves into the grooves in section K of the support sleeve 2.

C L A I M S

1. Apparatus for attachment of an end of a pipe (10) to a  
constructional element (1), such as a nipple or the like,  
5 furnished with a support sleeve (2), the external surface of  
which is profiled, preferably with circumferential beads (14) and  
grooves (12,13), and which is insertable into said pipe end,  
clamping means (3,4;5,7) being provided to hold said pipe end  
fixed to said constructional element (1) in sealing relation,  
10 c h a r a c t e r i z e d i n t h a t the apparatus is  
designed for alternative or simultaneous use as a clamping screw  
joint and a sliding sleeve joint, respectively, for the clamping  
screw joint being provided, as known per se, a screw sleeve (7)  
and a clamping ring (5) associated to the latter radially inside  
15 the same and surrounding the external surface of said pipe end,  
and for the sliding sleeve joint being provided, as known per se,  
a sliding sleeve (3) which, upon sliding of said pipe end onto  
the support sleeve (2) and sliding of a press ring (4) onto the  
external surface of said pipe end, is slidable in axial direction  
20 onto said press ring (4), the constructional element (1) being  
designed and provided with fitting means for both kinds of  
joints.

2. Apparatus according to claim 1, c h a r a c t e r i z e d  
25 i n t h a t the external diameter of the support sleeve (2) at  
the most is equally large as the internal diameter of the pipe  
(10) to be attached prior to deformation, and/or that the support  
sleeve (2) is provided with at least partly different, preferably  
differently profiled sections (K, S), of which sections one (S)  
30 is associated to the clamping ring (5) for the screw sleeve (7)  
adjacent to the constructional element (1) and the other one (K)  
to the press ring (4) for the sliding sleeve (3) connecting to  
the first-mentioned region (S) towards the free end of the  
support sleeve, possibly with a certain overlap with profiling  
35 common to both types of joints.

3. Apparatus according to claim 1, c h a r a c t e r i z e d  
i n t h a t the constructional element (1) carrying the support

sleeve (2) is provided with a recessed conical annular surface (36) at the mouth of an axially open annular groove (19) surrounding the base of the support sleeve (2) within a shoulder (6) of the constructional element (1), which surface (36) is provided to cooperate with a circumferential bevel (32) at the one end of the clamping ring (5), that on the outside of the constructional element (1) carrying the support sleeve (2) there is provided a thread (9) onto which the screw sleeve (7) is screwable, and that the screw sleeve (7) is provided with a conical surface (35), which is associated to a further circumferential bevel (32) at the other end of the clamping ring (5).

4. Apparatus according to claim 1, characterized in that at the end of the constructional element (1) facing the support sleeve (2) there is provided an annular abutment surface (30), to which is associated an annular abutment surface (29) at the press ring (4).

5. Apparatus according to claim 4, characterized in that the section (S) of the support sleeve (2) associated to the clamping ring (5) of the clamping screw joint shows fewer, e.g. three, and/or smaller and/or differently shaped grooves (13) compared to the preferably four grooves (12) of the section (K) of the support sleeve (2), which section is associated to the press ring (4) of the sliding sleeve joint.

6. Apparatus according to any of claims 1 - 5, characterized in that the press ring (4) of the sliding sleeve joint shows a smooth internal surface (23) and an external surface profiled by the provision of ring-shaped beads (24), which external surface is associated to the internal surface of the sliding sleeve (3), and that the press ring (4) is shaped thinner at its end (46) turned away from the annular support surface (29) than in the other regions, particularly in the end region a groove (34) being provided outside the last bead (24).

7. Apparatus according to any of claims 1 - 6, characterized in that the sliding sleeve (3) shows a

cylindrical internal surface (21) with a circumferential diverging bevel (20) at each end.

8. Apparatus according to any of claims 1 - 7, characterized in that the flanks (15) of the beads (14) of the support sleeve (2) turned towards the free end (11) of the latter, between which flanks the grooves (12) are provided, include a smaller angle with the axis of the support sleeve (2) than the other flanks (16), and/or that the flanks (27) of the beads (24) of the press ring (4) include equally large angles with the axis (26) of the press ring (4), and/or that the flank (28) of the end bead (24) of the press ring (4) turned towards the free end (37) of the latter includes a smaller angle with the press ring axis (26) than the flanks of the other beads (24).

15

9. Apparatus according to any of claims 1 - 8, characterized in that the beads (14) of the support sleeve (2) and/or the beads (24) of the press ring (4) are terminated outwardly by cylindrical surfaces (18; 25).

20

10. Apparatus according to any of claims 1 - 9, characterized in that the constructional element (1), preferably in its mid region in axial direction, is provided with a for instance hexagonal profile for the engagement of a tool, such as a spanner.

25

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Fig. 1

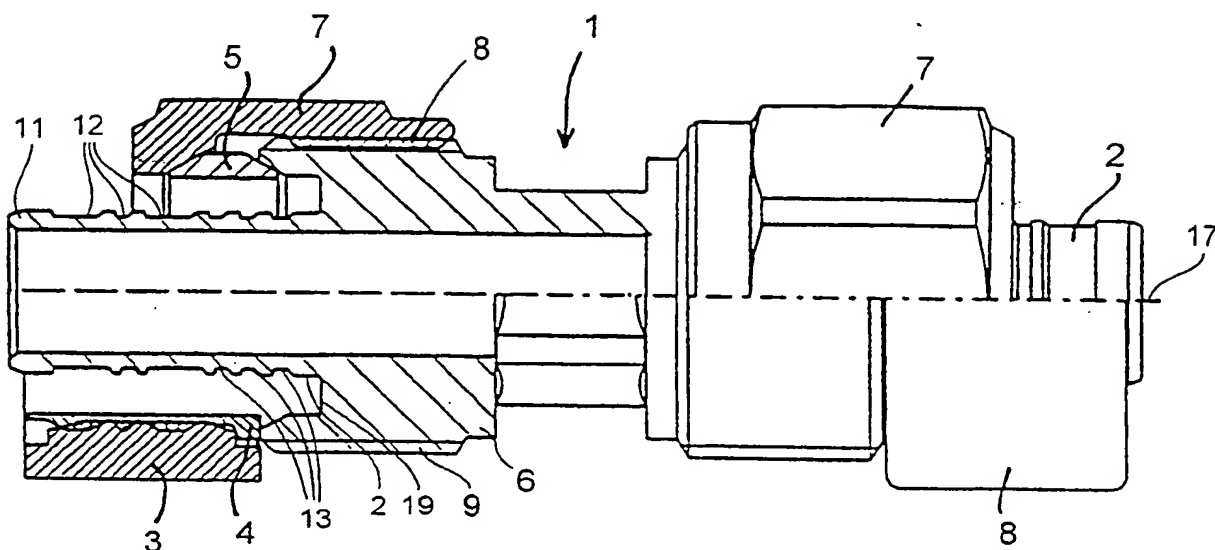


Fig. 2

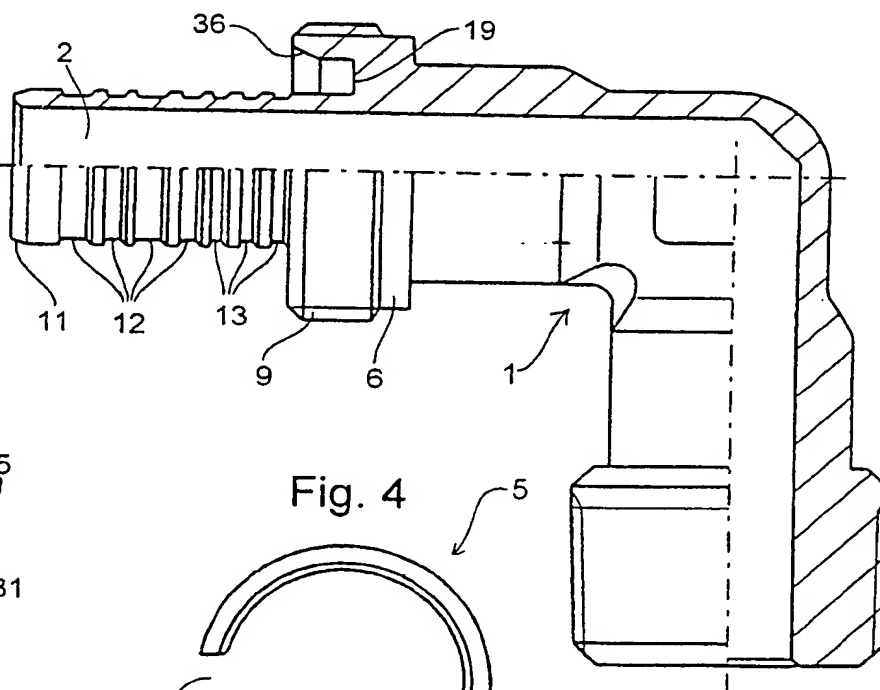


Fig. 3

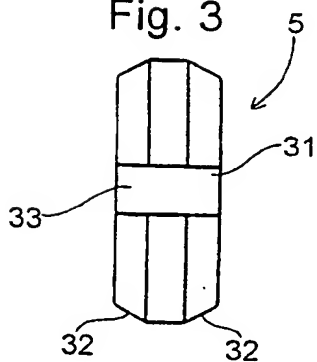
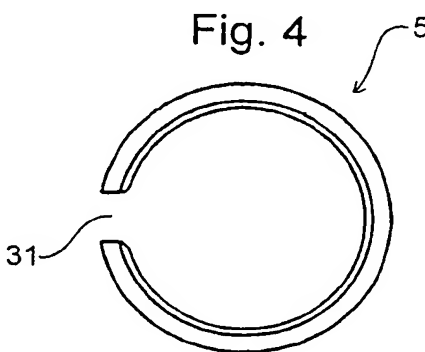


Fig. 4



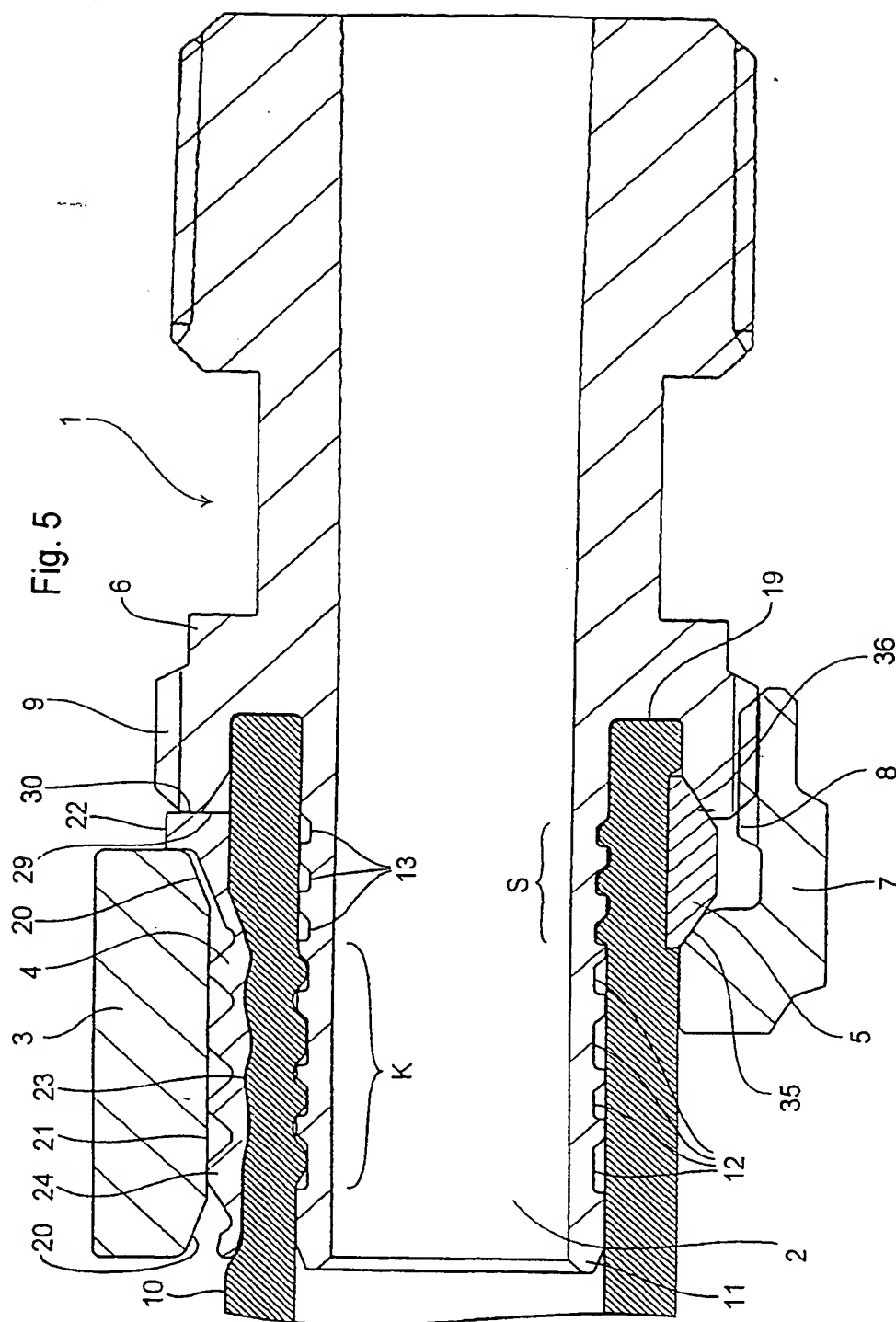


Fig. 6

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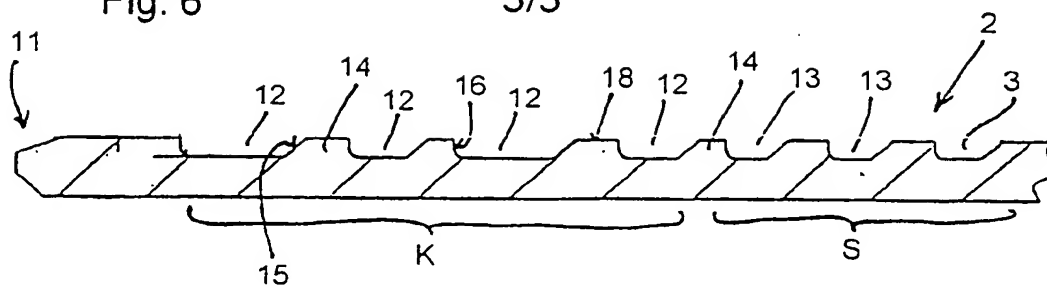


Fig. 7

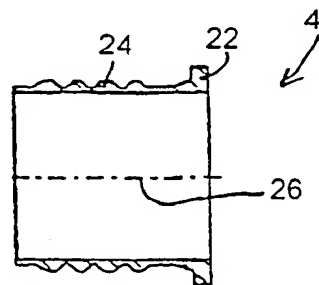
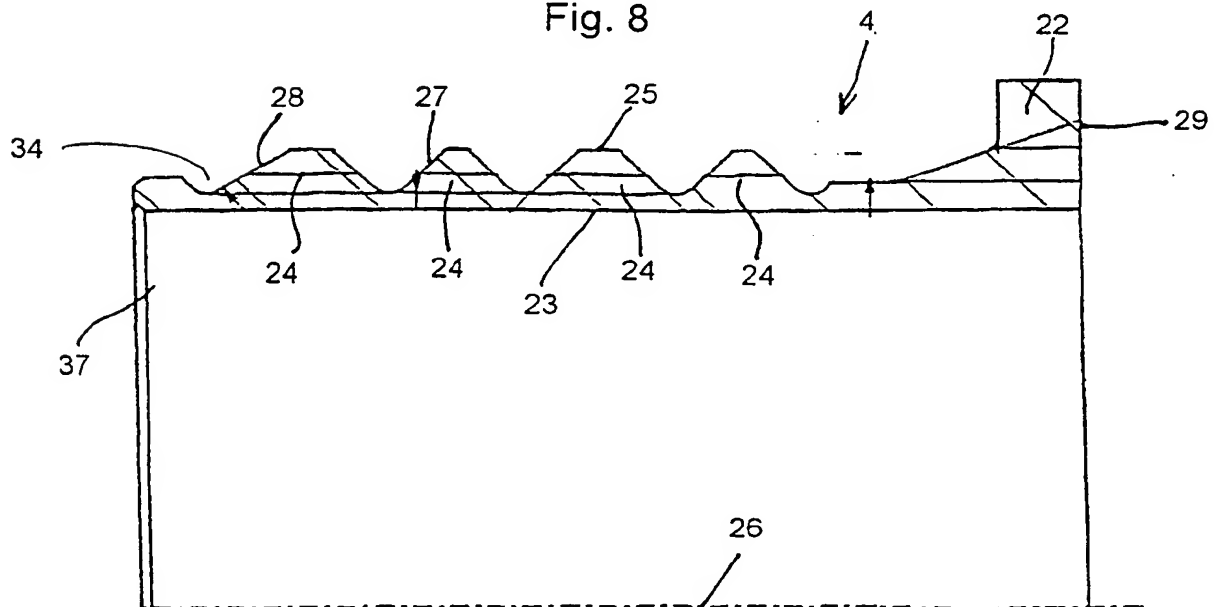


Fig. 8





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INTERNATIONAL SEARCH REPORTInternational application No.  
PCT/SE 95/00222

## A. CLASSIFICATION OF SUBJECT MATTER

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## C. DOCUMENTS CONSIDERED TO BE RELEVANT

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Y	EP, A1, 0503737 (ROMANELLI), 16 Sept 1992 (16.09.92), figure 2 --	1,10



Further documents are listed in the continuation of Box C.



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C (Continuation). DOCUMENTS CONSIDERED TO BE RELEVANT

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**INTERNATIONAL SEARCH REPORT**  
Information on patent family members

03/05/95

International application No.  
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